

OPEN ROOF ASSEMBLY FOR A VEHICLE, AND
FRAME PART FOR APPLICATION THEREIN

BACKGROUND OF THE INVENTION

5 The invention relates to an open roof assembly for a vehicle. More particularly, the present invention relates to an open roof assembly comprising a roof opening provided in the roof of the vehicle and a closure mechanism movable
10 relative to the roof opening for opening and closing the latter. The roof opening is surrounded by a frame connected to the roof of the vehicle, which frame at least comprises two guides extending along opposite longitudinal edges of the roof
15 opening for cooperation with the closure mechanism, and drain channels extending substantially along all edges of the roof opening.

 The frame of such an open roof assembly comprises several parts, such as the two guides and
20 the drain channels. During assembly of the open roof assembly, these parts are joined to create the frame that has to be connected to the roof of the vehicle. In corner areas of the frame preferably plastic materials are used, which should have
25 specific adhesive properties, thus decreasing the choice of plastic materials to form such components. Further, due to the ever increasing complexity of open roof assemblies of the type referred to above, the demands on the parts of such
30 an open roof assembly, especially the frame parts,

will increase. Finally, while joining the separate parts of the frame special care should be taken for obtaining a proper sealing between the parts.

SUMMARY OF THE INVENTION

5 It is an object of the present invention to provide an improved open roof assembly of the type referred to above.

 Thus, in accordance with one aspect of the present invention there is provided an open
10 roof assembly for a vehicle, comprising a roof opening provided in the roof of the vehicle and a closure mechanism movable relative to the roof opening for opening and closing the latter, wherein the roof opening is surrounded by a frame connected
15 to the roof of the vehicle, which frame at least comprises two guides extending along opposite longitudinal edges of the roof opening for cooperation with the closure mechanism, and drain channels extending substantially along all edges of
20 the roof opening, wherein the drain channels are integrally combined into one single frame part, and wherein said frame part comprises receiving recesses for housing the two guides.

 Because the drain channels are integrally
25 combined into one single frame part the problems originating from joining separate parts are greatly eliminated. Such a single frame part, which substantially is constituted by the drain channels, is self-supporting. During assembly of the open
30 roof assembly, only the guides should be inserted into the receiving recesses. An additional

advantage is provided in that the guides will be positioned in a dry region of the open roof assembly.

In one embodiment, the receiving recesses
5 of the frame part are shaped as gutters engaging the guides substantially at the bottom side and at the two lateral sides.

As a result the gutters substantially surround the guides, especially at the lower part
10 thereof, such that separate sealing mechanisms between the guides and the frame part are not necessary. Moreover an effective connection between the guides and the frame part is realized. As a result, the guides obtain a stable position on the
15 frame part.

Further it is possible, that the drain channels, extending along the transversal edges of the roof opening, bridge the gutters and the guides received therein.

20 The transversally extending drain channels (forward drain channel and rearward drain channel) not only bridge the guides received in the gutters, but also prevent these from moving upwards out of the receiving recesses (gutters). Thus, the
25 bridging parts of the transversally extending drain channels define a fail-safe feature, which comes into effect when the connection between the guides and the gutters should fail.

Further, preferably the receiving
30 recesses and guides are provided with cooperating fixing mechanisms for detachably connecting the

guides to the recesses. Such cooperating fixing mechanisms could, for example, comprise snap mechanisms known per se.

In a further embodiment, the frame part
5 comprises provisions for a connection thereof to the roof of the vehicle. Such provisions could comprise extensions of the frame part provided with holes for receiving screws, bolts or alike for a connection to the roof of the vehicle. However, the
10 frame part also can include provisions for a connection thereto of other parts belonging to the open roof assembly, such as for example a sun screen assembly, a driving assembly or a control unit.

15 In still a further embodiment, of the open roof assembly according to the invention the frame part is provided with a cover or covers for covering selected areas of the frame part such as, for example, channels for driving cables or alike.

20 Often an open roof assembly of the type referred to above includes channels for driving cables for driving the closure mechanism. The cover or covers then could cover such channels. However, also other parts of the frame part could be covered
25 by such cover or covers.

A second aspect of the present invention relates to a frame part for application in an open roof assembly according to the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

30 Hereinafter the invention will be elucidated referring to the drawings, in which an

embodiment of the open roof assembly according to the invention is illustrated.

Figure 1 shows perspectively a frame part
for application in an open roof assembly according
5 to the invention, partly disassembled, and

Figure 2 shows, on a larger scale, a detail of the frame part illustrated in fig 1.

Figure 3 is a schematic top plan view of a roof assembly.

10 DETAILED DESCRIPTION OF THE ILLUSTRATIVE
 EMBODIMENT

Referring firstly to fig. 3, a frame 15 is illustrated for surrounding a roof opening 16 provided in a roof 18 of a vehicle. The frame 15 forms part of a roof assembly, which further includes a closure mechanism having a closure element 21 for selectively closing or at least partially releasing the roof opening 16. The closure element 21 may be a rigid panel, in particular a transparent panel of glass or plastic material, but may also be constructed as slats, a flexible cover or the like.

In order to enable the movements of panel 21, panel 21 engages suitable guide rails 8 with its lateral ends, as is well known. The movement of the panel 21 relative to the guide rails 8 is effected by driving means such as an electric motor or a hand crank 24, the rotation of which is converted into a sliding movement and transmitted to driving cables 26, 28 directly or indirectly connected to the panel 21.

Referring to fig. 1, the frame basically includes two drain channels 1, 2 extending longitudinally (i.e. lengthwise relative to the vehicle represented by roof 18). Further, the frame includes a forward drain channel 3 and a rearward drain channel 4 extending transversally to drain channels 1 and 2. When the frame, as is known per se, has been mounted around the roof opening 16 of the vehicle, said drain channels 1-4 are positioned along the corresponding edges of the roof opening 16 for collecting water (e.g. rain water) entering the roof opening 16.

Further, near to its rearward drain channel 4, the frame is provided with mounting mechanism or flange 5 for a winding mechanism for a sunscreen (not shown in detail) or other parts. Such a winding mechanism or other parts are known per se, and their details are not relevant for the present invention.

The frame as illustrated in fig. 1 and fig. 2 further comprises at least two guides extending along the opposite longitudinal drain channels 1, 2 (and thus along opposite longitudinal edges of the roof opening not shown) for cooperation with the closure mechanism, as is known per se. In fig. 1 and fig. 2 the guides 8 are not yet present in the frame 15, but will be applied in a manner to be described below.

Finally, the frame 15 is provided with provisions 6 for a connection thereof to the stationary roof part of the vehicle. Such

provisions may, for example, comprise extensions of the frame body provided with holes for receiving screws or bolts to be attached to the stationary roof part of the vehicle. However, also other
5 appropriate mechanisms such as snaps for obtaining a connection between the frame 15 and the stationary part of the roof of the vehicle may be applied.

The longitudinal drain channels 1, 2 and
10 forward drain channel 3 as well as rearward drain channel 4 are integrally combined into one single frame part formed as or from a single unitary body. Thus, the frame 15 already obtains its structural integrity by means of said drain channels.

15 Now reference is made to fig. 2 which shows, on a larger scale, a detail of the frame illustrated in fig. 1. Fig. 2 shows one longitudinal drain channel 1, the forward drain channel 3 and rearward drain channel 4. Further,
20 part of the mounting mechanism 5 for a sunscreen or other part and some of the provisions 6 for obtaining a connection with a stationary part of the vehicle, are illustrated.

The frame part includes gutters 7, which
25 define receiving recesses for housing guides. One such guide is illustrated at 8, and can be slid into the gutters 7 as indicated by arrow 9. These guides 8 cooperate with corresponding slide shoes or alike of the closure mechanism for closing and
30 opening a roof opening 16 which is surrounded by the frame 15.

The gutters 7 are shaped such that they engage the guides 8 (when applied in the gutters) substantially at the bottom side and at the two lateral sides. As a result a stable positioning of the guides 8 within the gutters 7 is obtained. Further, the gutters or receiving recesses 7 and guides 8 may be provided with cooperating fixing mechanisms herein illustrated as one or more snap connections formed between the part 15 and the guide rail 8. In the embodiment illustrated, projections 34 are provided on the frame part 15, while corresponding recesses 32 for receiving the projections 34 are provided on the guide rail 8. It should be noted the position of projection 34 illustrated co-operates with a recess not shown, while the recess 32 illustrated co-operates with a projection not shown. As appreciated by those skilled in the art, the projections can be disposed on the guide rail 8, with the recesses formed on the frame part 15. Likewise, other fixing mechanisms such as fasteners or the like for detachably connecting the guides 8 to the recesses 7 can be used.

As mentioned before, the longitudinal drain channels 1,2 and forward and rearward drain channels 3 and 4, respectively, are integrally combined into one single frame part. Because, however, the guides 8 have to be slid longitudinally into the gutters 7, the forward drain channel 3 and rearward drain channel 4 bridge the gutters 7 (and the guides 8 received therein).

Bridging sections 10 and 11 of the forward drain channel 3 and rearward drain channel 4, respectively, are indicated in fig. 2. These bridging sections 10,11 also assist in maintaining the guides 8 at the desired location within the gutters 7.

When comparing the forward drain channel 3 with the rearward drain channel 4, it appears that the forward drain channel 3 is deeper than the rearward drain channel 4. This is because the rearward drain channel 4 should leave enough space for the passage of a sunscreen.

Rearward drain tubes 12 directly connect to the longitudinal drain channel 1, 2. Forward drain tubes 13 directly connect to the forward drain channel 3. Water entering the rearward drain channel 4 flows over the bridging sections 11 thereof into the longitudinal drain channels 1, 2. Water entering the forward drain channel 3 will not pass the bridging sections 10 (because these are elevated relative to the remainder of the bottom of the forward drain channel 3) and will leave the frame through the forward drain tubes 13.

FIG. 1 illustrates that the frame part 15 may be provided with a cover or covers 30 for covering selected areas of the frame part 15 (illustrated in a spaced apart or detached position), such as for example channels for driving cables or alike. Such channels could be provided within the guides 8 or within the frame itself.

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The invention is not limited to the embodiment described before which may be varied widely within the scope of the invention as defined by the claims.

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